883M

Vibration Sensor

User Manual

Revision 1.0 - December 2024

Wilcoxon
SENSING TECHNOLOGIES

Revision History

Version	Date	Comments
1.0	2024-12-06	First version

Content

1. Introduction 1
   1.1 Features 1
   1.2 Applications 1
2. Specification 2
   2.1 Measurement Specification 2
   2.2 Sensor Measurement Direction Definition 3
   2.3 Sensor Pin Definition 3
   2.4 Cable Pin Definition (Optional) 4
   2.5 Sensor LED Indicator 4
3. 883M Utility 5
   3.1 Setup and Measurement Procedures 5
      3.1.1 Connection Settings 6
      3.1.2 Communication Protocol Configuration 6
      3.1.3 View Vibration Data 7
      3.1.4 View Time Waveform and FFT Spectrum 7
      3.1.5 Export Overall Vibration as CSV 8
      3.1.6 Export Time Waveform and FFT Spectrum as CSV 8
      3.1.7 Waveform Size and FFT Bandwidth Settings 9
   3.2 Update Firmware 9
4. Modbus RTU Format 10
5. Code Table 10
6. 0x03(3) Function Code Details 11
7. 0x04(4) Function Code Details 13
8. 0x06(6) Function Code Details 20
9. 0x10(16) Function Code Details 22
10. 0x2B(43)_0x0E(14) Function Code Details 24
   10.1 Example 27
11. 0x80(128) Error Code Details 28

1. Introduction

The 883M is a high-precision triaxial MEMS vibration sensor that simultaneously detects overall, True-peak, temperature, time waveform, FFT spectrum, and other values. Its robust and reliable design, and communication through standard RS485 interface and Modbus RTU protocols make it ideal for applications in semiconductor industry equipment condition monitoring, predictive maintenance, and automated integration.

1.1 Features

- Triaxial synchronous measurement with real-time status indication through LED lights.
- Detection overall of vibration acceleration, velocity (ISO 10816, ISO/TR 17243-1), and displacement.
- Synchronous measurement of temperature.
- Extraction of time-domain waveforms and calculation of FFT spectra.
- Detection of True-peak for real-time prediction of bearing condition.
- IP67 design suitable for harsh environments and clean room process areas.

1.2 Applications

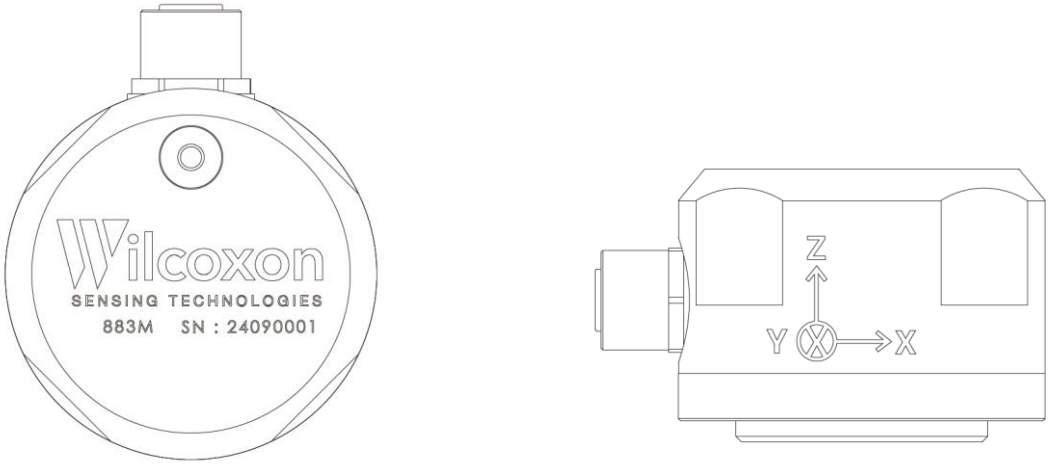
- Monitoring of semiconductor industry and advanced process equipment condition.
- Industrial automation process monitoring.
- Monitoring of machine tools in machining processes.
- Integration applications of IoT and big data.
- Monitoring of operational condition in transportation vehicles and aircraft.

2. Specification

2.1 Measurement Specification

Dynamic	
Axis	Triaxial
Acceleration Range	±16 g-peak
Resolution	0.488mg
Frequency Range	2Hz~5kHz
Output Data	
Displacement RMS	2Hz~1kHz, 10Hz~1kHz
Displacement Peak	2Hz~1kHz, 10Hz~1kHz
Velocity RMS	10Hz~1kHz, 10Hz~5kHz
Velocity Peak	10Hz~1kHz, 10Hz~5kHz
Acceleration RMS	2Hz~1kHz, 10Hz~5kHz
Acceleration Peak	2Hz~1kHz, 10Hz~5kHz
Temperature	-20°C～70°C
True peak	Fs @ 13.333kHz
Spectrum	0Hz~5kHz, Lines=6145
Timewave	13,333 samples, 1 second
Other Features	Crest Factor, Standard Deviation
Communication	
Interface	RS485
Protocol	Modbus RTU
Max. baud rate	921600 bps
Electrical	
Power	6VDC~24VDC
LED Indicator	1 (RGB)
Environmental and Mechanical	
Dimension	Ø 35 x 26 mm
Weight	75 grams (Body)
IP Rating	IP67
Connector	M8 4 pin Female connector
Mounting	Adhesive, bolt/screw & magnet
Operation Temperature	-20°C～70°C
Storage Temperature	-20°C～80°C
Operation Humidity	5%~95% RH
Certification	CE

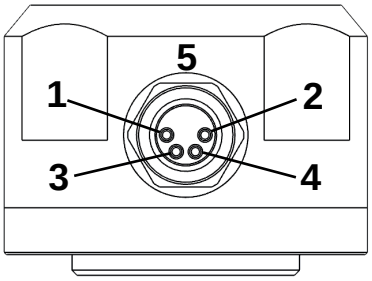
2.2 Sensor Measurement Direction Definition



Top View **Left Side View**

Fig. 2.2 Sensor Measurement Direction Definition

2.3 Sensor Pin Definition

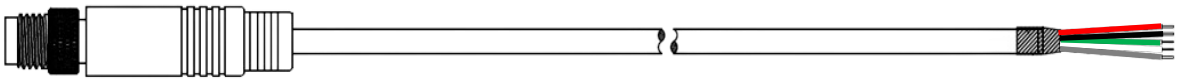


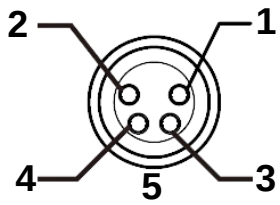
Pin	Definition
1	Power 6~24V
2	Ground
3	Signal +
4	Signal -
5*	Shielding

***HOUSING**

Table 2.3 Sensor Pin Definition

2.4 Cable Pin Definition (Optional)





PIN	Color	Definition
1	Red	Power 6~24V
2	Black	Ground
3	Green	Signal +
4	White	Signal -
5*	--	Shielding

***HOUSING**

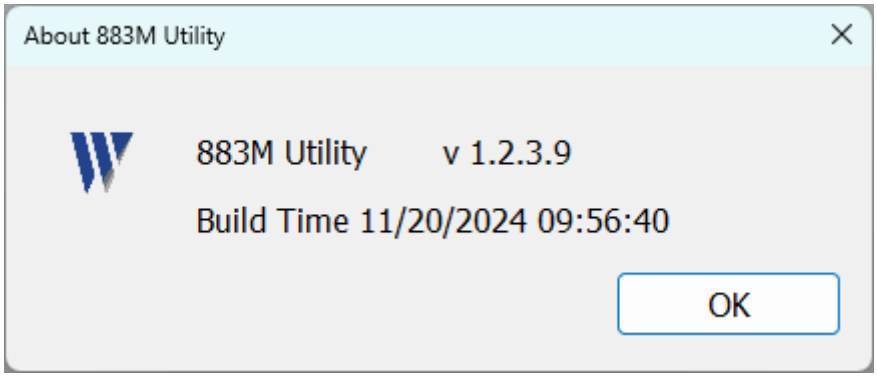
Table 2.4 Cable Pin Definition

2.5 Sensor LED Indicator

Item	Status	Description
○	White Light Briefly On	Power-on and self-test in progress
✳	Blue Light Flashing	Standby mode
✳	Green Light Flashing	Data transmission in progress
●	Blue Light Constantly On	Sensor abnormality detected
✳	Red Light Flashing	Firmware update in progress

Table 2.5 Sensor LED Indicator

3. 883M Utility



***Note: The version number is based on the latest release.**

Fig. 3. 883M Utility

3.1 Setup and Measurement Procedures

Users can connect the 883M sensor to a computer using the included 883M Utility software and an RS485 to USB converter (optional) to configure communication protocols, update firmware, and view vibration data.

Fig. 3.1 RS485 to USB Adapter

3.1.1 Connection Settings

Device > Search > Scan > Slave ID > Connect

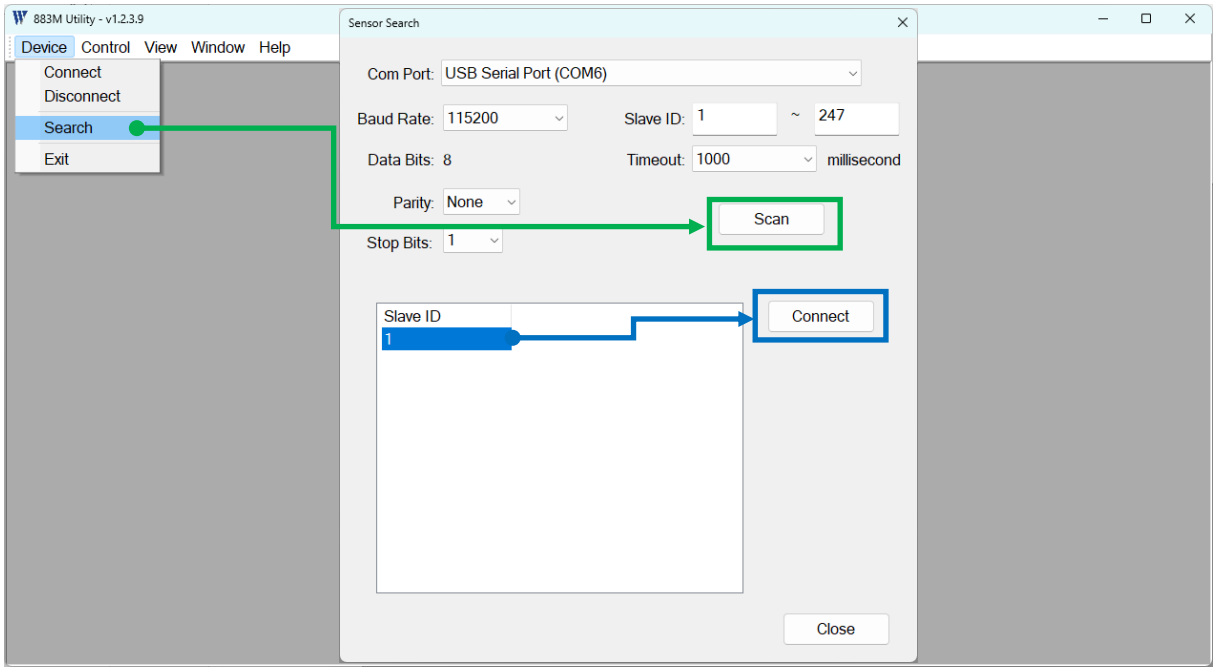


Fig. 3.1.1 Connection Setting

3.1.2 Communication Protocol Configuration

Control > Setting > Edit > Write to Sensor

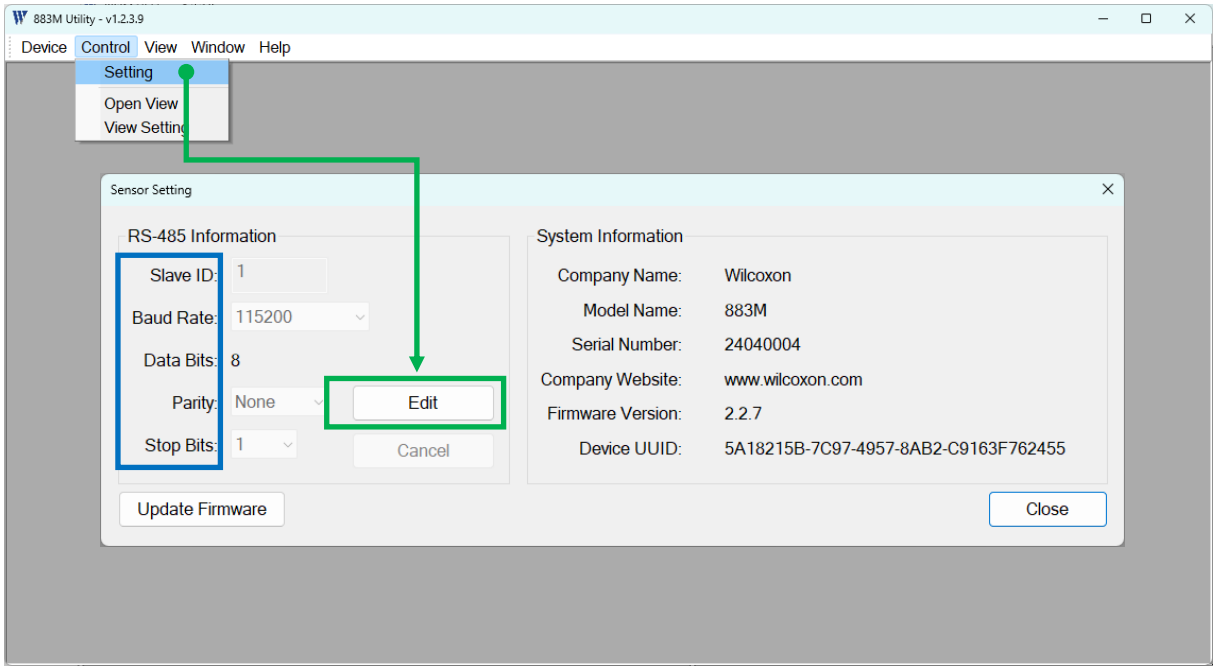


Fig. 3.1.2 Communication Protocol Configuration

3.1.3 View Vibration Data

Control > Open View > Start

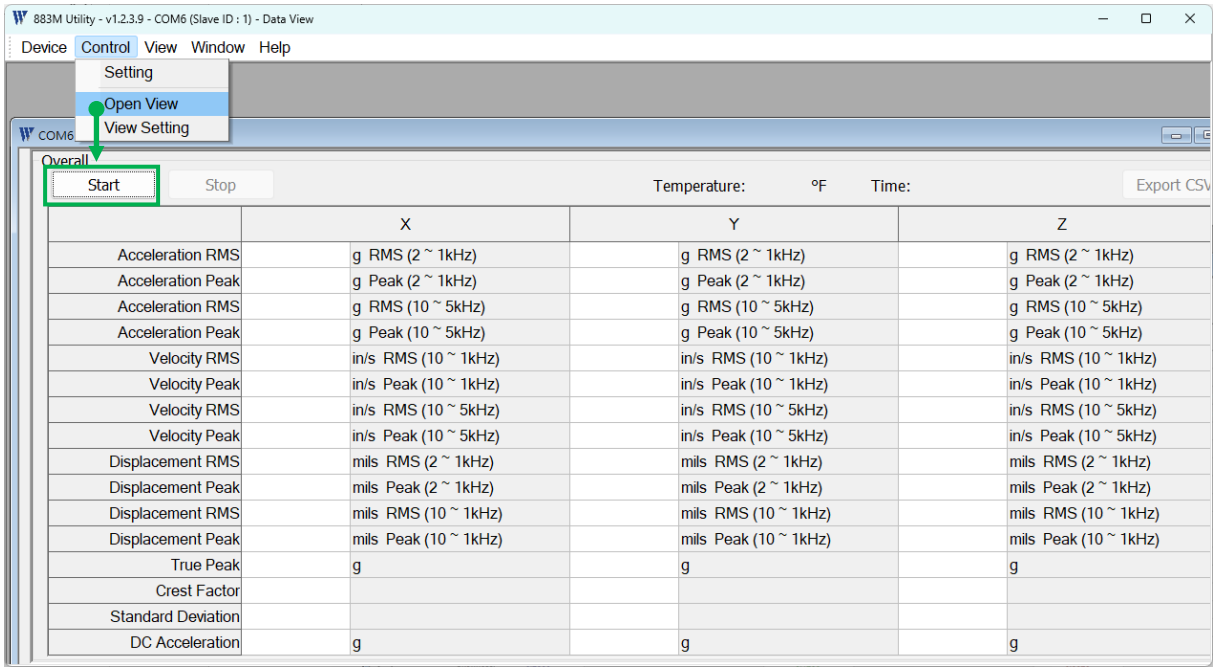


Fig. 3.1.3 View Vibration Data

3.1.4 View Time Waveform and FFT Spectrum

Calculate (Waveform / FFT) > Get Data

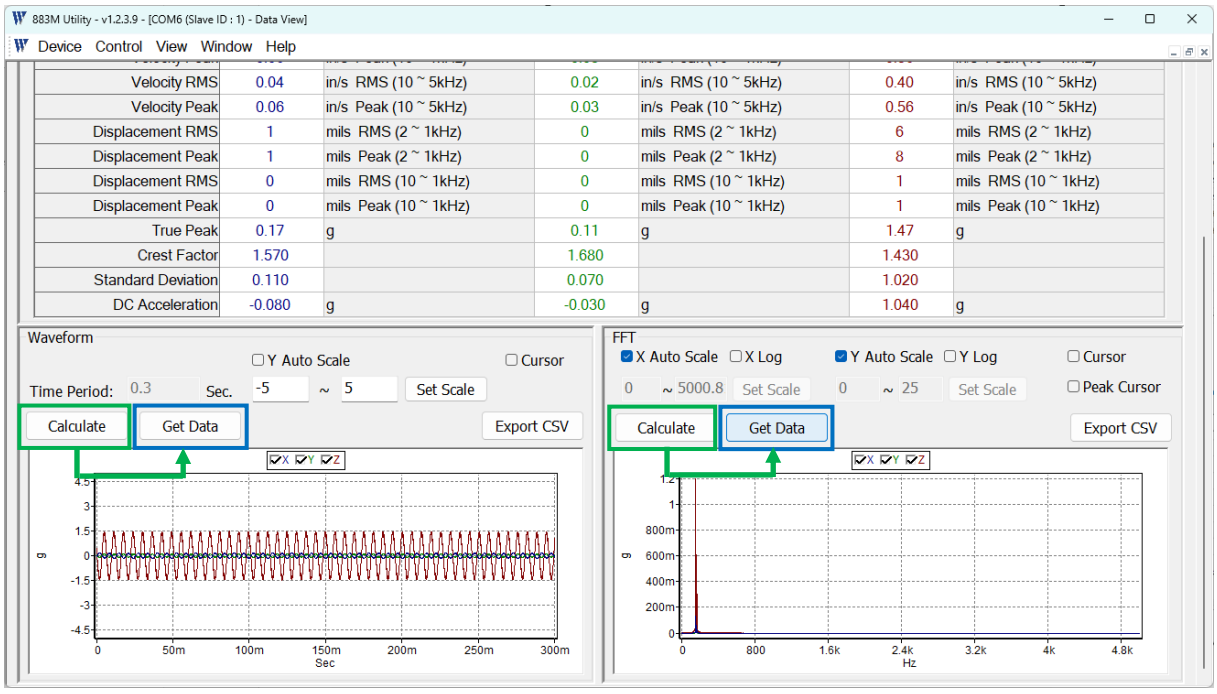


Fig. 3.1.4 View Time Waveform and FFT Spectrum

3.1.5 Export Overall Vibration as CSV

Start > Export CSV

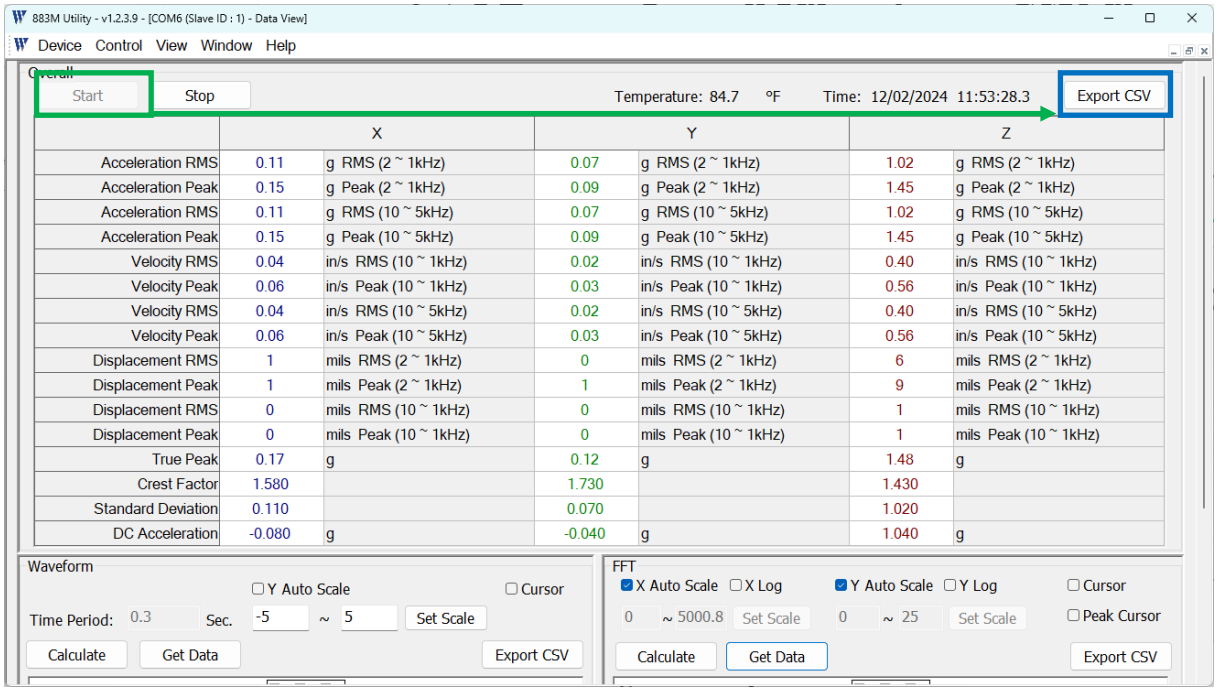


Fig. 3.1.5 Export Overall Vibration as CSV File

3.1.6 Export Time Waveform and FFT Spectrum as CSV

Calculate (Waveform / FFT) > Get Data > Export CSV

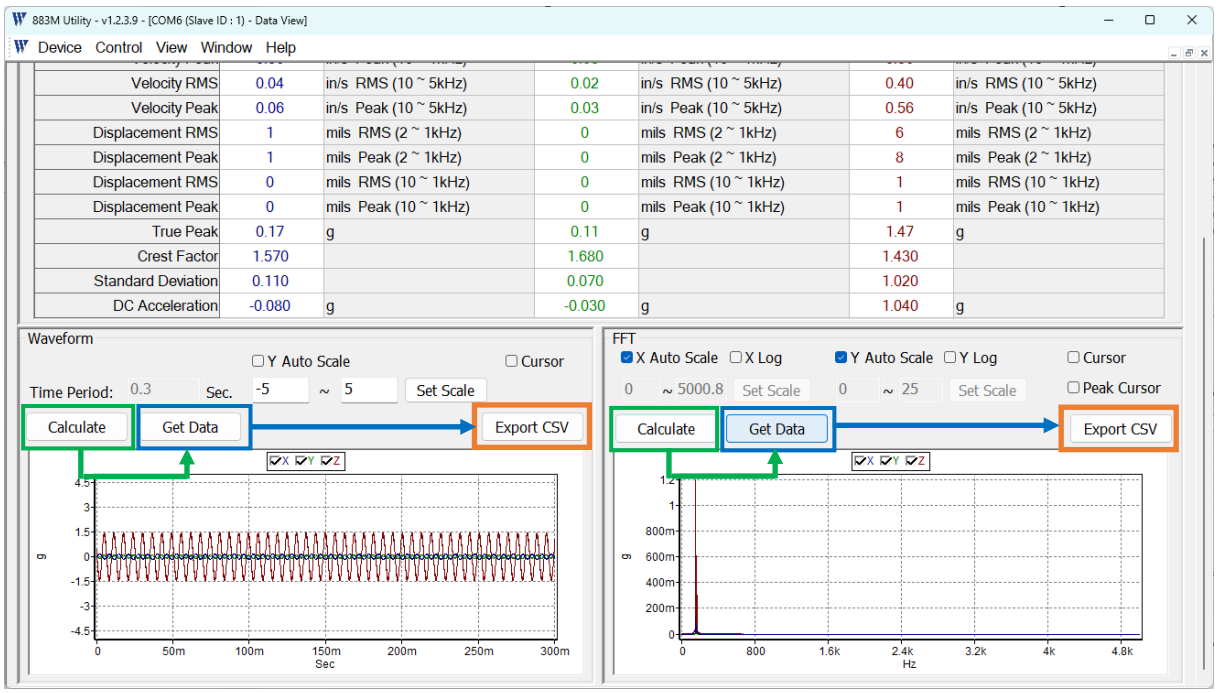


Fig. 3.1.6 Export Time Waveform and FFT Spectrum as CSV File

3.1.7 Waveform Size and FFT Bandwidth Settings

Control > View Settings

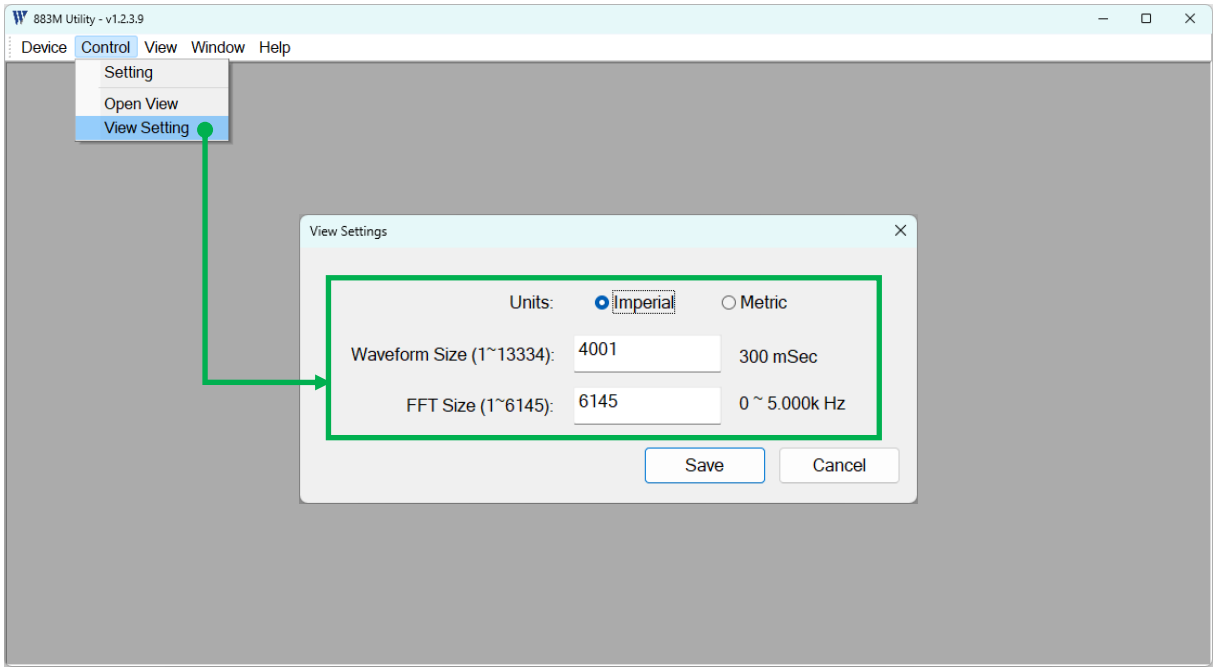


Fig. 3.1.7 View Settings

3.2 Update Firmware

Control > Setting > Update Firmware

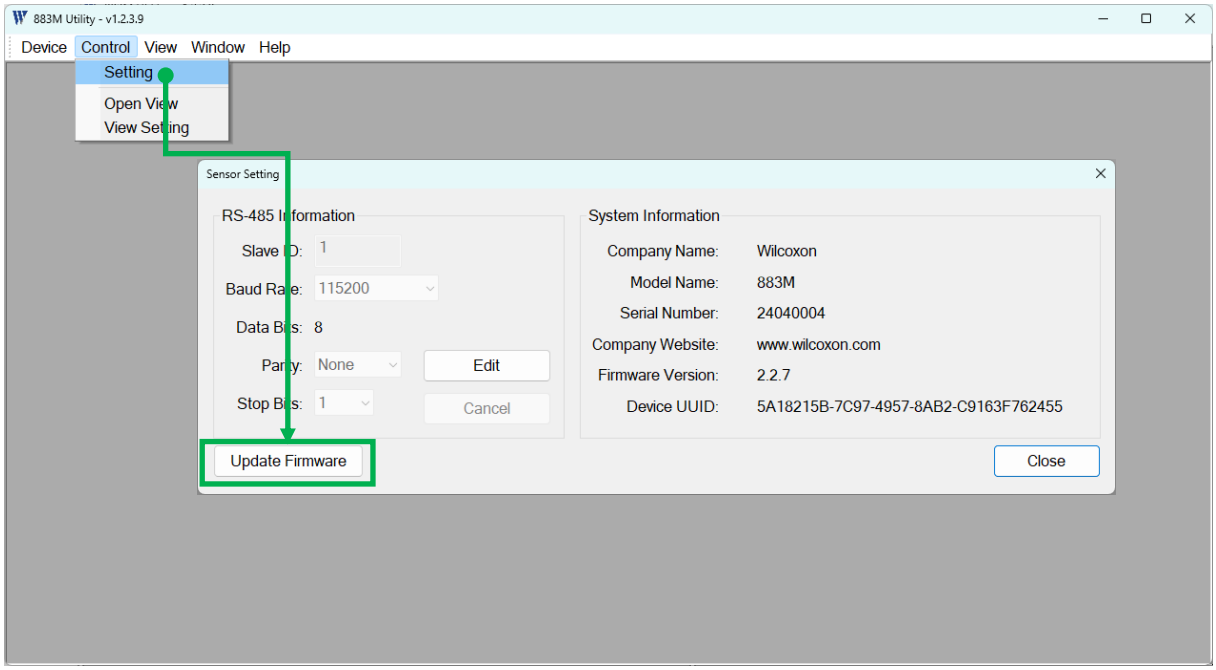


Fig. 3.2 Update Firmware

4. Modbus RTU Format

Slave ID	Function Code	Data	CRC
1 byte	1 byte	0 up to 252 bytes	2 bytes

Table 4. Modbus RTU Format

5. Code Table

Code (Hex)	Definition	Description
0x03	Read Holding Table	Read current sensor settings
0x04	Read Input Table	Read measurement data
0x06	Write Single Register	Modify individual sensor settings
0x10	Write Multiple Registers	Modify multiple sensor settings
0x2B	Read Device ID	Read sensor ID
0x80	Exception Responses	Error codes

Table 5. Code Table

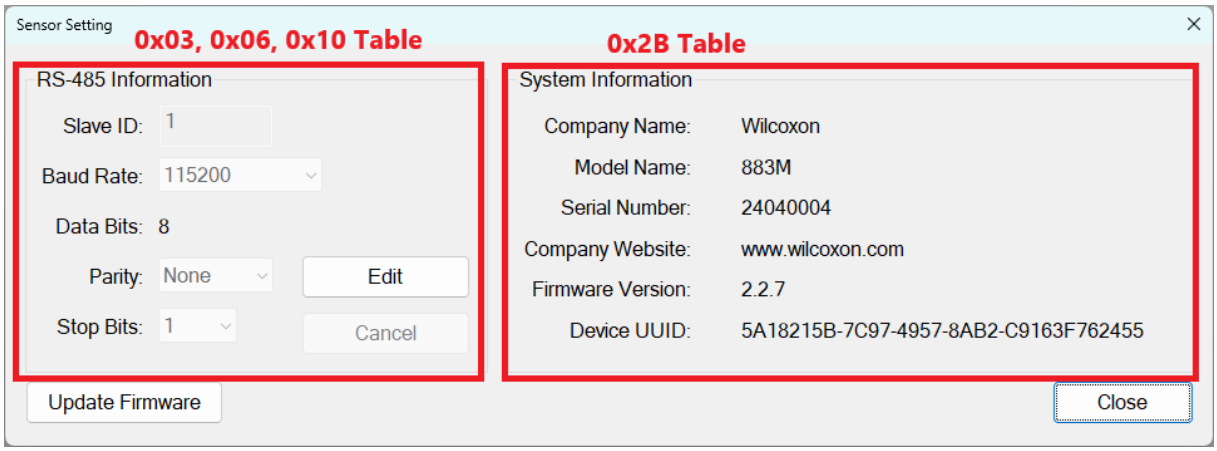


Fig. 5. Explanation of the Difference between Code 0x03 and 0x2B

6. 0x03(3) Function Code Details

Address	Data Format	Default	Description
0x0000	unsigned int16	0x0009	Baud Rate: 0x0006:1200 bps 0x0007:2400 bps 0x0008:4800 bps 0x0009:9600 bps 0x000A:19200 bps 0x000B:38400 bps 0x000C:57600 bps 0x000D:115200 bps 0x000E:230400 bps 0x000F: 460800 bps 0x0010: 921600 bps
0x0001	unsigned int16	0x0008	Data Bits: 0x0008: 8 bits
0x0002	unsigned int16	0x0000	Data Parity: 0x0000: None 0x0001: Even 0x0002: Odd
0x0003	unsigned int16	0x0001	Stop Bits: 0x0001: 1 bit 0x0002: 2 bits
0x0004	unsigned int16	0x0001	Modbus Slave ID: 0x0001~0x00F7: 1~ 247
0x0200	unsigned int16	0xEEEE	Table Data Ready for Read When register value=0x0000, use the function code 0x04 to get corresponding data.

Table 6. 0x03(3) Function Code Details

Request

Function code	1 Byte	**0x03**
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Registers	2 Bytes	1 to 125 (0x7D)

Response

Function code	1 Byte	**0x03**
Byte count	1 Byte	2 x **N***
Register value	**N*** x 2 Bytes	

***N** = Quantity of Registers

Error

Error code	1 Byte	**0x83**
Exception code	1 Byte	01 or 02 or 03 or 04

Here is an example of a request to read registers 108 – 110:

Request		**Response**	
Field Name	*(Hex)*	*Field Name*	*(Hex)*
Function	03	Function	03
Starting Address Hi	00	Byte Count	06
Starting Address Lo	6B	Register value Hi (108)	02
No. of Registers Hi	00	Register value Lo (108)	2B
No. of Registers Lo	03	Register value Hi (109)	00
		Register value Lo (109)	00
		Register value Hi (110)	00
		Register value Lo (110)	64

The contents of register 108 are shown as the two byte values of 02 2B hex, or 555 decimal. The contents of registers 109–110 are 00 00 and 00 64 hex, or 0 and 100 decimal, respectively.

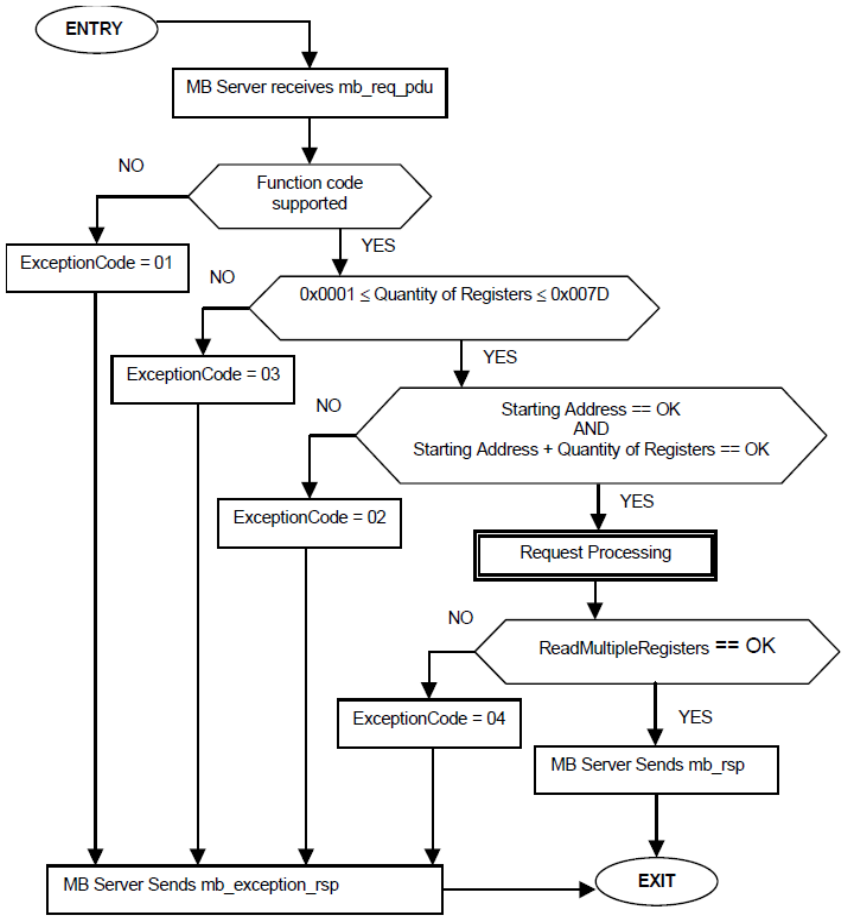


Fig. 6. Read 0x03(3) Function Code Flowchart (Refer to MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b)

7. 0x04(4) Function Code Details

Measurement Value (Metric)			
Address	**Data Format**	**Unit**	**Description**
0x0000	unsigned int16	0.01 g	Acceleration (2Hz~1kHz) RMS, X
0x0001	unsigned int16	0.01 g	Acceleration (2Hz~1kHz) RMS, Y
0x0002	unsigned int16	0.01 g	Acceleration (2Hz~1kHz) RMS, Z
0x0003	N/A	N/A	(Read Return 0x0000)
0x0004	unsigned int16	0.01 g	Acceleration (2Hz~1kHz) Peak, X
0x0005	unsigned int16	0.01 g	Acceleration (2Hz~1kHz) Peak, Y
0x0006	unsigned int16	0.01 g	Acceleration (2Hz~1kHz) Peak, Z
0x0007	N/A	N/A	(Read Return 0x0000)
0x0008	unsigned int16	0.1 m/s^2	Acceleration (2Hz~1kHz) RMS, X
0x0009	unsigned int16	0.1 m/s^2	Acceleration (2Hz~1kHz) RMS, Y
0x000A	unsigned int16	0.1 m/s^2	Acceleration (2Hz~1kHz) RMS, Z
0x000B	N/A	N/A	(Read Return 0x0000)
0x000C	unsigned int16	0.1 m/s^2	Acceleration (2Hz~1kHz) Peak, X
0x000D	unsigned int16	0.1 m/s^2	Acceleration (2Hz~1kHz) Peak, Y
0x000E	unsigned int16	0.1 m/s^2	Acceleration (2Hz~1kHz) Peak, Z
0x000F	N/A	N/A	(Read Return 0x0000)
0x0010	unsigned int16	0.01 g	Acceleration (10Hz~5kHz) RMS, X
0x0011	unsigned int16	0.01 g	Acceleration (10Hz~5kHz) RMS, Y
0x0012	unsigned int16	0.01 g	Acceleration (10Hz~5kHz) RMS, Z
0x0013	N/A	N/A	(Read Return 0x0000)
0x0014	unsigned int16	0.01 g	Acceleration (10Hz~5kHz) Peak, X
0x0015	unsigned int16	0.01 g	Acceleration (10Hz~5kHz) Peak, Y
0x0016	unsigned int16	0.01 g	Acceleration (10Hz~5kHz) Peak, Z
0x0017	N/A	N/A	(Read Return 0x0000)
0x0018	unsigned int16	0.1 m/s^2	Acceleration (10Hz~5kHz) RMS, X
0x0019	unsigned int16	0.1 m/s^2	Acceleration (10Hz~5kHz) RMS, Y
0x001A	unsigned int16	0.1 m/s^2	Acceleration (10Hz~5kHz) RMS, Z
0x001B	N/A	N/A	(Read Return 0x0000)
0x001C	unsigned int16	0.1 m/s^2	Acceleration (10Hz~5kHz) Peak, X
0x001D	unsigned int16	0.1 m/s^2	Acceleration (10Hz~5kHz) Peak, Y
0x001E	unsigned int16	0.1 m/s^2	Acceleration (10Hz~5kHz) Peak, Z
0x001F	N/A	N/A	(Read Return 0x0000)
0x0020	unsigned int16	0.1 mm/s	Velocity (10Hz~1kHz) RMS, X
0x0021	unsigned int16	0.1 mm/s	Velocity (10Hz~1kHz) RMS, Y
0x0022	unsigned int16	0.1 mm/s	Velocity (10Hz~1kHz) RMS, Z
0x0023	N/A	N/A	(Read Return 0x0000)
0x0024	unsigned int16	0.1 mm/s	Velocity (10Hz~1kHz) Peak, X
0x0025	unsigned int16	0.1 mm/s	Velocity (10Hz~1kHz) Peak, Y

0x0026	unsigned int16	0.1 mm/s	Velocity (10Hz~1kHz) Peak, Z
0x0027	N/A	N/A	(Read Return 0x0000)
0x0028	unsigned int16	0.1 mm/s	Velocity (10Hz~5kHz) RMS, X
0x0029	unsigned int16	0.1 mm/s	Velocity (10Hz~5kHz) RMS, Y
0x002A	unsigned int16	0.1 mm/s	Velocity (10Hz~5kHz) RMS, Z
0x002B	N/A	N/A	(Read Return 0x0000)
0x002C	unsigned int16	0.1 mm/s	Velocity (10Hz~5kHz) Peak, X
0x002D	unsigned int16	0.1 mm/s	Velocity (10Hz~5kHz) Peak, Y
0x002E	unsigned int16	0.1 mm/s	Velocity (10Hz~5kHz) Peak, Z
0x002F	N/A	N/A	(Read Return 0x0000)
0x0030	unsigned int16	um	Displacement (2Hz~1kHz) RMS, X
0x0031	unsigned int16	um	Displacement (2Hz~1kHz) RMS, Y
0x0032	unsigned int16	um	Displacement (2Hz~1kHz) RMS, Z
0x0033	N/A	N/A	(Read Return 0x0000)
0x0034	unsigned int16	um	Displacement (2Hz~1kHz) Peak, X
0x0035	unsigned int16	um	Displacement (2Hz~1kHz) Peak, Y
0x0036	unsigned int16	um	Displacement (2Hz~1kHz) Peak, Z
0x0037	N/A	N/A	Reserved (read return 0x0000)
0x0038	unsigned int16	um	Displacement (10Hz~1kHz) RMS, X
0x0039	unsigned int16	um	Displacement (10Hz~1kHz) RMS, Y
0x003A	unsigned int16	um	Displacement (10Hz~1kHz) RMS, Z
0x003B	N/A	N/A	(Read Return 0x0000)
0x003C	unsigned int16	um	Displacement (10Hz~1kHz) Peak, X
0x003D	unsigned int16	um	Displacement (10Hz~1kHz) Peak, Y
0x003E	unsigned int16	um	Displacement (10Hz~1kHz) Peak, Z
0x003F	N/A	N/A	(Read Return 0x0000)
0x0040	unsigned int16	0.01 g	True peak, X
0x0041	unsigned int16	0.01 g	True peak, Y
0x0042	unsigned int16	0.01 g	True peak, Z
0x0043	N/A	N/A	(Read Return 0x0000)
0x0044	unsigned int16	0.01	Crest Factor, X
0x0045	unsigned int16	0.01	Crest Factor, Y
0x0046	unsigned int16	0.01	Crest Factor, Z
0x0047	N/A	N/A	(Read Return 0x0000)
0x0048	unsigned int16	0.01	Standard Deviation, X
0x0049	unsigned int16	0.01	Standard Deviation, Y
0x004A	unsigned int16	0.01	Standard Deviation, Z
0x004B	N/A	N/A	(Read Return 0x0000)
0x004C	signed int16	0.01 g	DC Acceleration, X
0x004D	signed int16	0.01 g	DC Acceleration, Y
0x004E	signed int16	0.01 g	DC Acceleration, Z
0x004F	N/A	N/A	(Read Return 0x0000)

0x0050	signed int16	0.1 °C	Temperature

Measurement Value (Imperial)			
Address	**Data Format**	**Unit**	**Description**
0x0100	unsigned int16	0.01 g	Acceleration (2Hz~1kHz) RMS, X
0x0101	unsigned int16	0.01 g	Acceleration (2Hz~1kHz) RMS, Y
0x0102	unsigned int16	0.01 g	Acceleration (2Hz~1kHz) RMS, Z
0x0103	N/A	N/A	(Read Return 0x0000)
0x0104	unsigned int16	0.01 g	Acceleration (2Hz~1kHz) Peak, X
0x0105	unsigned int16	0.01 g	Acceleration (2Hz~1kHz) Peak, Y
0x0106	unsigned int16	0.01 g	Acceleration (2Hz~1kHz) Peak, Z
0x0107	N/A	N/A	(Read Return 0x0000)
0x0108	N/A	N/A	(Read Return 0x0000)
0x0109	N/A	N/A	(Read Return 0x0000)
0x010A	N/A	N/A	(Read Return 0x0000)
0x010B	N/A	N/A	(Read Return 0x0000)
0x010C	N/A	N/A	(Read Return 0x0000)
0x010D	N/A	N/A	(Read Return 0x0000)
0x010E	N/A	N/A	(Read Return 0x0000)
0x010F	N/A	N/A	(Read Return 0x0000)
0x0110	unsigned int16	0.01 g	Acceleration (10Hz~5kHz) RMS, X
0x0111	unsigned int16	0.01 g	Acceleration (10Hz~5kHz) RMS, Y
0x0112	unsigned int16	0.01 g	Acceleration (10Hz~5kHz) RMS, Z
0x0113	N/A	N/A	(Read Return 0x0000)
0x0114	unsigned int16	0.01 g	Acceleration (10Hz~5kHz) Peak, X
0x0115	unsigned int16	0.01 g	Acceleration (10Hz~5kHz) Peak, Y
0x0116	unsigned int16	0.01 g	Acceleration (10Hz~5kHz) Peak, Z
0x0117	N/A	N/A	(Read Return 0x0000)
0x0118	N/A	N/A	(Read Return 0x0000)
0x0119	N/A	N/A	(Read Return 0x0000)
0x011A	N/A	N/A	(Read Return 0x0000)
0x011B	N/A	N/A	(Read Return 0x0000)
0x011C	N/A	N/A	(Read Return 0x0000)
0x011D	N/A	N/A	(Read Return 0x0000)
0x011E	N/A	N/A	(Read Return 0x0000)
0x011F	N/A	N/A	(Read Return 0x0000)
0x0120	unsigned int16	0.01 inch/s	Velocity (10Hz~1kHz) RMS, X
0x0121	unsigned int16	0.01 inch/s	Velocity (10Hz~1kHz) RMS, Y
0x0122	unsigned int16	0.01 inch/s	Velocity (10Hz~1kHz) RMS, Z
0x0123	N/A	N/A	(Read Return 0x0000)
0x0124	unsigned int16	0.01 inch/s	Velocity (10Hz~1kHz) Peak, X
0x0125	unsigned int16	0.01 inch/s	Velocity (10Hz~1kHz) Peak, Y

0x0126	unsigned int16	0.01 inch/s	Velocity (10Hz~1kHz) Peak, Z
0x0127	N/A	N/A	(Read Return 0x0000)
0x0128	unsigned int16	0.01 inch/s	Velocity (10Hz~5kHz) RMS, X
0x0129	unsigned int16	0.01 inch/s	Velocity (10Hz~5kHz) RMS, Y
0x012A	unsigned int16	0.01 inch/s	Velocity (10Hz~5kHz) RMS, Z
0x012B	N/A	N/A	(Read Return 0x0000)
0x012C	unsigned int16	0.01 inch/s	Velocity (10Hz~5kHz) Peak, X
0x012D	unsigned int16	0.01 inch/s	Velocity (10Hz~5kHz) Peak, Y
0x012E	unsigned int16	0.01 inch/s	Velocity (10Hz~5kHz) Peak, Z
0x012F	N/A	N/A	(Read Return 0x0000)
0x0130	unsigned int16	0.1 mil	Displacement (2Hz~1kHz) RMS, X
0x0131	unsigned int16	0.1 mil	Displacement (2Hz~1kHz) RMS, Y
0x0132	unsigned int16	0.1 mil	Displacement (2Hz~1kHz) RMS, Z
0x0133	N/A	N/A	(Read Return 0x0000)
0x0134	unsigned int16	0.1 mil	Displacement (2Hz~1kHz) Peak, X
0x0135	unsigned int16	0.1 mil	Displacement (2Hz~1kHz) Peak, Y
0x0136	unsigned int16	0.1 mil	Displacement (2Hz~1kHz) Peak, Z
0x0137	N/A	N/A	(Read Return 0x0000)
0x0138	unsigned int16	0.1 mil	Displacement (10Hz~1kHz) RMS, X
0x0139	unsigned int16	0.1 mil	Displacement (10Hz~1kHz) RMS, Y
0x013A	unsigned int16	0.1 mil	Displacement (10Hz~1kHz) RMS, Z
0x013B	N/A	N/A	(Read Return 0x0000)
0x013C	unsigned int16	0.1 mil	Displacement (10Hz~1kHz) Peak, X
0x013D	unsigned int16	0.1 mil	Displacement (10Hz~1kHz) Peak, Y
0x013E	unsigned int16	0.1 mil	Displacement (10Hz~1kHz) Peak, Z
0x013F	N/A	N/A	(Read Return 0x0000)
0x0140	unsigned int16	0.01 g	True Peak, X
0x0141	unsigned int16	0.01 g	True Peak, Y
0x0142	unsigned int16	0.01 g	True Peak, Z
0x0143	N/A	N/A	(Read Return 0x0000)
0x0144	unsigned int16	0.01	Crest Factor, X
0x0145	unsigned int16	0.01	Crest Factor, Y
0x0146	unsigned int16	0.01	Crest Factor, Z
0x0147	N/A	N/A	(Read Return 0x0000)
0x0148	unsigned int16	0.01	Standard Deviation, X
0x0149	unsigned int16	0.01	Standard Deviation, Y
0x014A	unsigned int16	0.01	Standard Deviation, Z
0x014B	N/A	N/A	(Read Return 0x0000)
0x014C	signed int16	0.01 g	DC Acceleration, X
0x014D	signed int16	0.01 g	DC Acceleration, Y
0x014E	signed int16	0.01 g	DC Acceleration, Z
0x014F	N/A	N/A	(Read Return 0x0000)

0x0150	signed int16	0.1 °F	Temperature

X Acceleration FFT (Peak) Data (Size: 6145)			
Address	**Data Format**	**Unit**	**Description (deltaF:13333.333/16384 Hz)**
0x0600	unsigned int16	0.001g	X FFT Data (deltaF Index 0, 0Hz)
0x0601	unsigned int16	0.001g	X FFT Data (deltaF Index 1)
0x0602	unsigned int16	0.001g	X FFT Data (deltaF Index 2)
…	…	…	…
0x1E00	unsigned int16	0.001g	X FFT Data (deltaF Index 6144)

X Acceleration Time Waveform Data (Size: 13334)			
Address	**Data Format**	**Unit**	**Description (deltaT: 1/13333.333 sec)**
0x1E01	signed int16	0.001g	X Time Waveform Data (deltaT Index 0, 0 sec)
0x1E02	signed int16	0.001g	X Time Waveform Data (deltaT Index 1)
0x1E03	signed int16	0.001g	X Time Waveform Data (deltaT Index 2)
…	…	…	…
0x5216	signed int16	0.001g	X Time Waveform Data (deltaT Index 13333)

Y Acceleration FFT (Peak) Data (Size: 6145)			
Address	**Data Format**	**Unit**	**Description (deltaF:13333.333/16384 Hz)**
0x5900	unsigned int16	0.001g	Y FFT Data (deltaF Index 0, 0 Hz)
0x5901	unsigned int16	0.001g	Y FFT Data (deltaF Index 1)
0x5902	unsigned int16	0.001g	Y FFT Data (deltaF Index 2)
…	…	…	…
0x7100	unsigned int16	0.001g	Y FFT Data (deltaF Index 6144)

Y Acceleration Time Waveform Data (Size: 13334)			
Address	**Data Format**	**Unit**	**Description (delta T: 1/13333.333 sec)**
0x7101	signed int16	0.001g	Y Time Waveform Data (deltaT Index 0, 0 sec)
0x7102	signed int16	0.001g	Y Time Waveform Data (deltaT Index 1)
0x7103	signed int16	0.001g	Y Time Waveform Data (deltaT Index 2)
…	…	…	…
0xA516	signed int16	0.001g	Y Time Waveform Data (deltaT Index 13333)

Z Acceleration FFT (Peak) Data (Size: 6145)			
Address	**Data Format**	**Unit**	**Description (deltaF:13333.333/16384 Hz)**
0xAC00	unsigned int16	0.001g	Z FFT Data (deltaF Index 0, 0 Hz)
0xAC01	unsigned int16	0.001g	Z FFT Data (deltaF Index 1)
0xAC03	unsigned int16	0.001g	Z FFT Data (deltaF Index 2)
…	…	…	…
0xC400	unsigned int16	0.001g	Z FFT Data (deltaF Index 6144)

Z Acceleration Time Waveform Data (Size: 13334)			
Address	**Data Format**	**Unit**	**Description (deltaT: 1/13333.333 sec)**
0xC401	signed int16	0.001g	Z Timewave data (deltaT Index 0, 0 sec)
0xC402	signed int16	0.001g	Z Timewave data (deltaT Index 1)
0xC403	signed int16	0.001g	Z Timewave data (deltaT Index 2)
…	..	…	…
0xF816	signed int16	0.001g	Z Timewave data (deltaT Index 13333)

Table 7. 0x04(4) Function Code Details

Request

Function code	1 Byte	**0x04**
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Input Registers	2 Bytes	0x0001 to 0x007D

Response

Function code	1 Byte	**0x04**
Byte count	1 Byte	2 x **N***
Input Registers	**N*** x 2 Bytes	

***N** = Quantity of Input Registers

Error

Error code	1 Byte	**0x84**
Exception code	1 Byte	01 or 02 or 03 or 04

Here is an example of a request to read input register 9:

Request		**Response**	
Field Name	*(Hex)*	*Field Name*	*(Hex)*
Function	**04**	Function	**04**
Starting Address Hi	**00**	Byte Count	**02**
Starting Address Lo	**08**	Input Reg. 9 Hi	**00**
Quantity of Input Reg. Hi	**00**	Input Reg. 9 Lo	**0A**
Quantity of Input Reg. Lo	**01**		

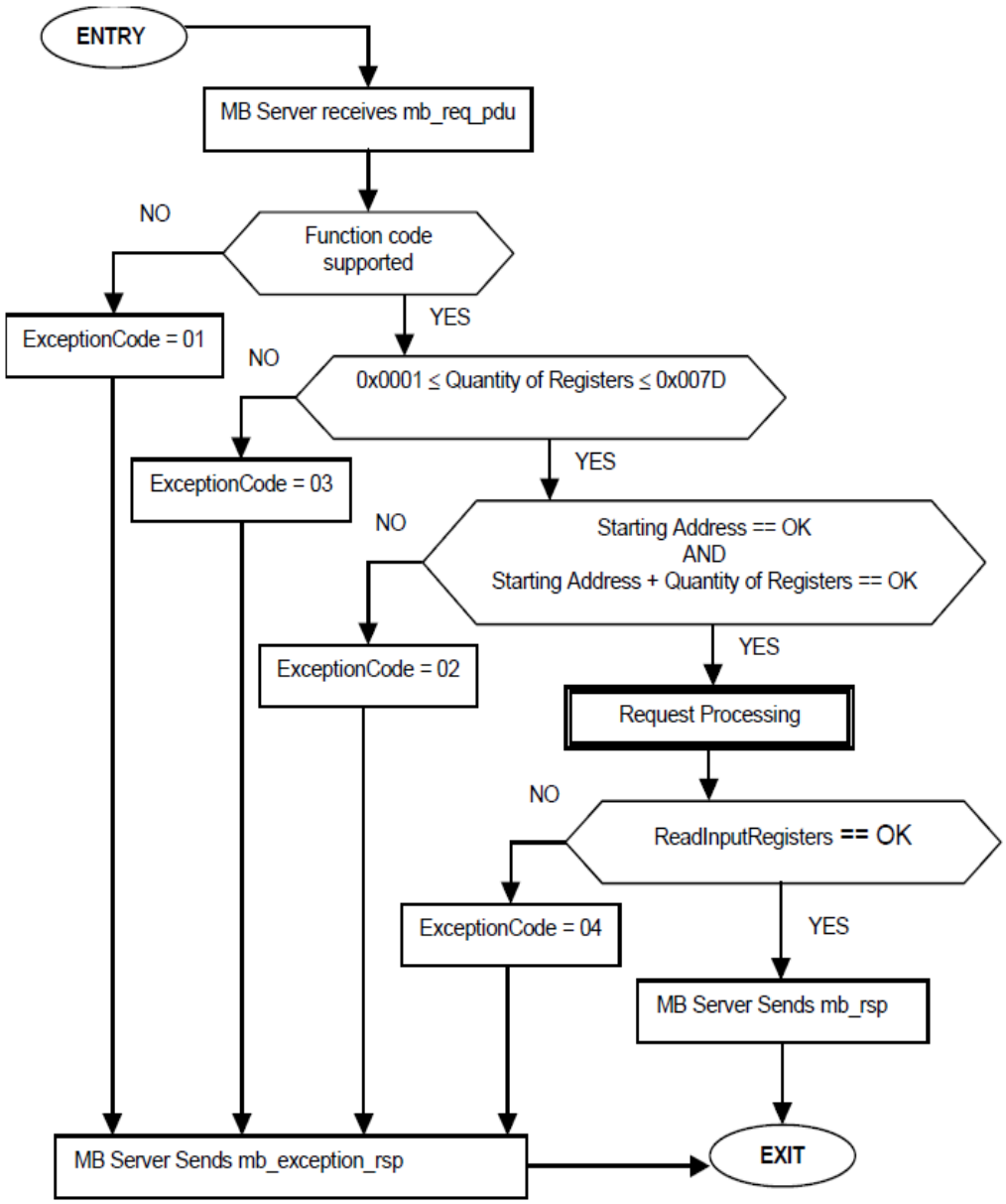


Fig. 7. Read 0x04(4) Function Code Flowchart (Refer to MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b)

8. 0x06(6) Function Code Details

Address	Data Format	Default	Description
0x0000	unsigned int16	0x0009	Baud Rate: 0x0006:1200 bps 0x0007:2400 bps 0x0008:4800 bps 0x0009:9600 bps 0x000A:19200 bps 0x000B:38400 bps 0x000C:57600 bps 0x000D:115200 bps 0x000E:230400 bps 0x000F: 460800 bps 0x0010: 921600 bps
0x0001	unsigned int16	0x0008	Data Bits: 0x0008: 8 bits
0x0002	unsigned int16	0x0000	Data Parity: 0x0000: None 0x0001: Even 0x0002: Odd
0x0003	unsigned int16	0x0001	Stop Bits: 0x0001: 1 bit 0x0002: 2 bits
0x0004	unsigned int16	0x0001	Modbus Slave ID: 0x0001~0x00F7: 1~ 247
0x0200	unsigned int16	0xEEEE	Table Data Update Trigger Write 0xFFFF to do Timewave and FFT calculation Use the function code 0x03 to read this value When register value=0x0000, use the function code 0x04 to get corresponding data.

Table 8. 0x06(6) Function Code Details

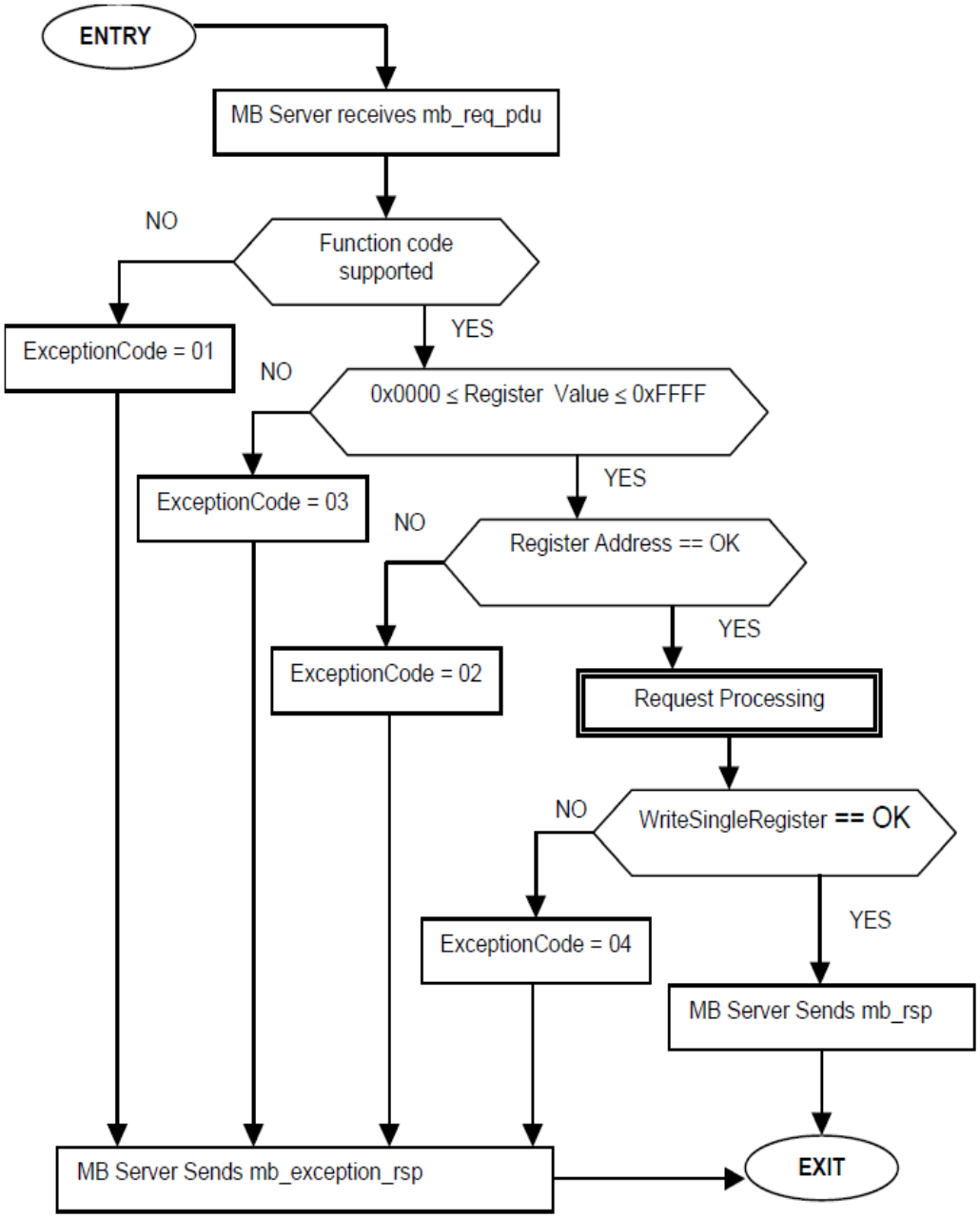


Fig. 8. Write 0x06(6) Function Code Flowchart (Refer to MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b)

9. 0x10(16) Function Code Details

Address	Data Format	Default	Description
0x0000	unsigned int16	0x0009	Baud Rate: 0x0006:1200 bps 0x0007:2400 bps 0x0008:4800 bps 0x0009:9600 bps 0x000A:19200 bps 0x000B:38400 bps 0x000C:57600 bps 0x000D:115200 bps 0x000E:230400 bps 0x000F: 460800 bps 0x0010: 921600 bps
0x0001	unsigned int16	0x0008	Data Bits: 0x0008: 8 bits
0x0002	unsigned int16	0x0000	Data Parity: 0x0000: None 0x0001: Even 0x0002: Odd
0x0003	unsigned int16	0x0001	Stop Bits: 0x0001: 1 bit 0x0002: 2 bits
0x0004	unsigned int16	0x0001	Modbus Slave ID: 0x0001~0x00F7: 1~ 247

Table 9. 0x10(16) Function Code Details

Request

Function code	1 Byte	0x10
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Registers	2 Bytes	0x0001 to 0x007B
Byte Count	1 Byte	2 x **N***
Registers Value	**N*** x 2 Bytes	value

*N = Quantity of Registers

Response

Function code	1 Byte	0x10
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Registers	2 Bytes	1 to 123 (0x7B)

Error

Error code	1 Byte	0x90
Exception code	1 Byte	01 or 02 or 03 or 04

Here is an example of a request to write two registers starting at 2 to 00 0A and 01 02 hex:

Request		Response	
Field Name	*(Hex)*	*Field Name*	*(Hex)*
Function	10	Function	10
Starting Address Hi	00	Starting Address Hi	00
Starting Address Lo	01	Starting Address Lo	01
Quantity of Registers Hi	00	Quantity of Registers Hi	00
Quantity of Registers Lo	02	Quantity of Registers Lo	02
Byte Count	04		
Registers Value Hi	00		
Registers Value Lo	0A		
Registers Value Hi	01		
Registers Value Lo	02		

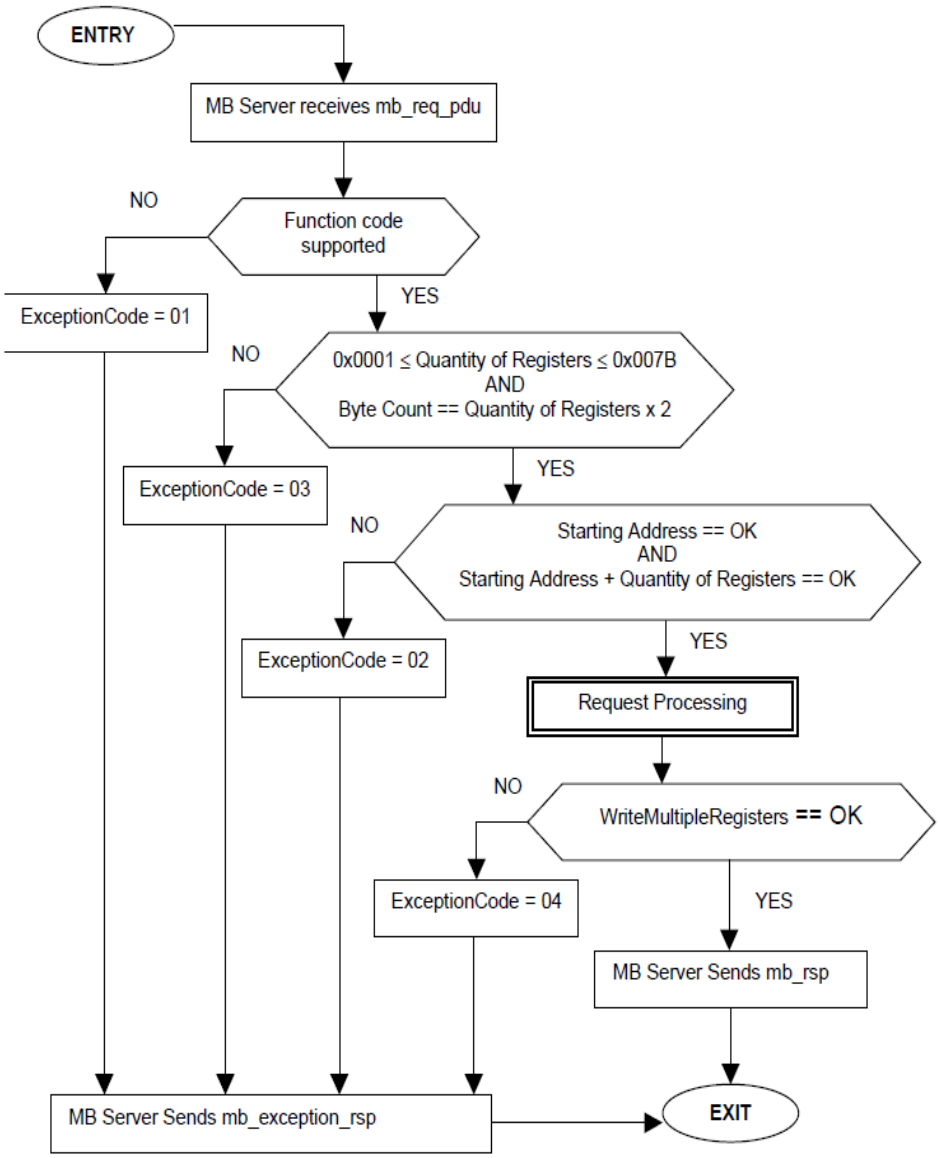


Fig. 9. Write 0x10(16) Function Code Flowchart (Refer to MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b)

10. 0x2B(43)_0x0E(14) Function Code Details

Object Id	Object Name / Description	Type	M/O	category
0x00	VendorName	ASCII String	**Mandatory**	**Basic**
0x01	ProductCode	ASCII String	**Mandatory**	
0x02	MajorMinorRevision	ASCII String	**Mandatory**	
0x03	VendorUrl	ASCII String	Optional	**Regular**
0x04	ProductName	ASCII String	Optional	
0x05	ModelName	ASCII String	Optional	
0x06	UserApplicationName	ASCII String	Optional	
0x07 … 0x7F	*Reserved*		Optional	
0x80 … 0xFF	*Private objects may be **optionally** defined. The range [0x80 – 0xFF] is Product dependant.*	device dependant	Optional	**Extended**

Object ID	Object Name	Meaning	Value
0x00	VendorName	Company name	Wilcoxon
0x01	ProductCode	Part Number	Product Number (xxxxxxxx)
0x02	MajorMinorRevision	Firmware Version	x.x.x
0x03	VendorUrl	Company website	www.wilcoxon.com
0x04	ProductName	Device UUID	12345678-1234-1234-1234-123456789012 (Format is ”8-4-4-4-12”)
0x05	ModelName	Model Name	883M

The parameter " Read Device ID code " allows to define four access types :

01: request to get the basic device identification (stream access)
02: request to get the regular device identification (stream access)

ID code	Meaning	Supported
01	request to get the device identification of category basic (stream access)	Yes
02	request to get the device identification of category regular (stream access)	Yes

Table 10. 0x2B(43)_0x0E(14) Function Code Details

Request

Function code	1 Byte	**0x2B**
MEI Type*	1 Byte	0x0E
Read Device ID code	1 Byte	01 / 02 / 03 / 04
Object Id	1 Byte	0x00 to 0xFF

* MEI = MODBUS Encapsulated Interface

Response

Function code	1 Byte	**0x2B**
MEI Type	1 byte	0x0E
Read Device ID code	1 Byte	01 / 02 / 03 / 04
Conformity level	1 Byte	0x01 or 0x02 or 0x03 or 0x81 or 0x82 or 0x83
More Follows	1 Byte	00 / FF
Next Object Id	1 Byte	Object ID number
Number of objects	1 Byte	
List Of		
Object ID	1 Byte	
Object length	1 Byte	
Object Value	Object length	Depending on the object ID

Error

Function code	1 Byte	**0xAB :** **Fc 0x2B + 0x80**
Exception code	1 Byte	01 or 02 or 03 or 04

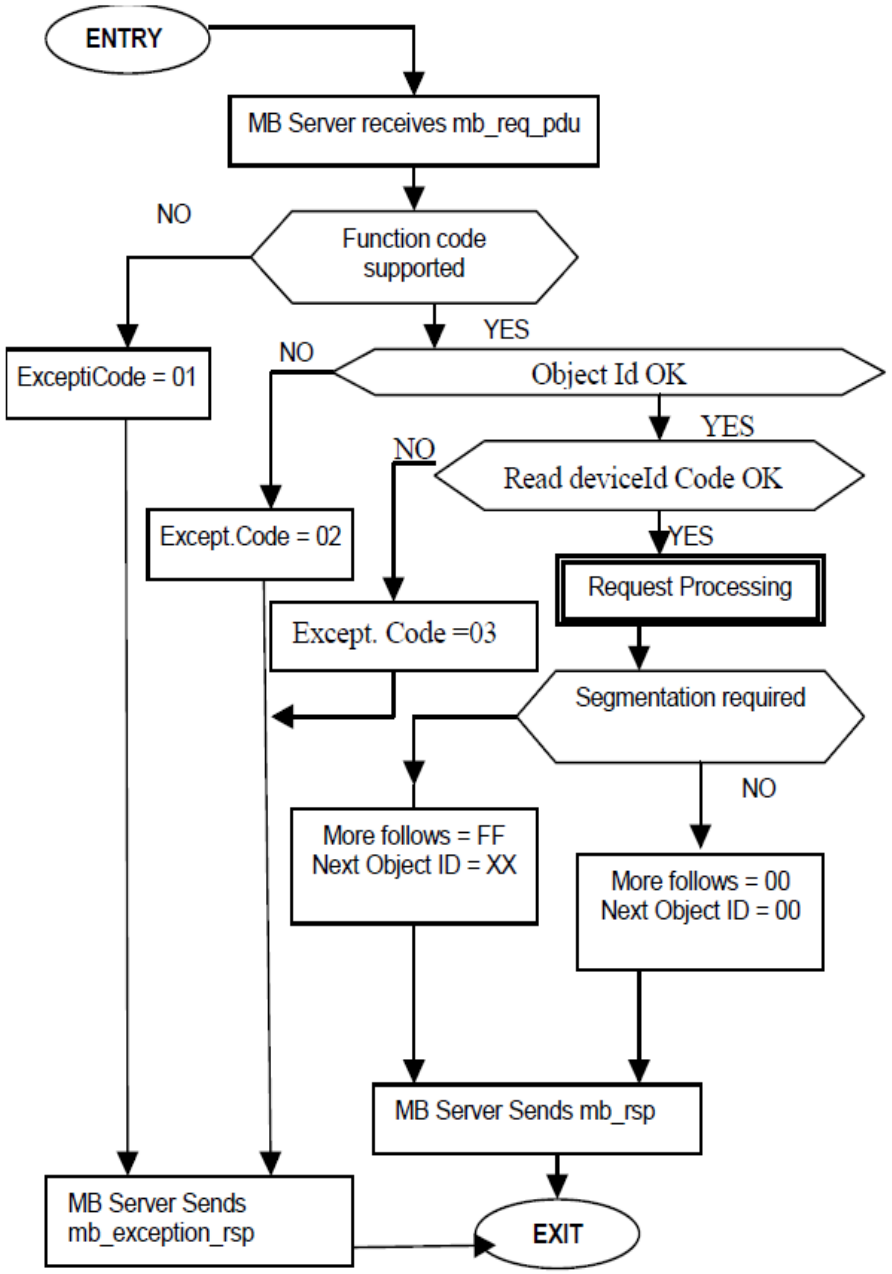


Fig. 10. Read 0x2B(43)_0x0E(14) Function Code Flowchart (Refer to MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b)

10.1 Example

- Request message: (01 2B 0E 01 00 70 77)
- Device address: 0x01
- Function code: 0x2B
- MEI type: 0x0E
- Read Device ID Code: 0x01 (Get the basic device identification)
- Object ID: 0x00
"-CRC16"

Receive messages:
(01 2B 0E 01 01 00 00 03 00 08 57 69 6C 63 6F 78 6F 6E 01 08 32 34 30 34 30 30 30 34 02 05 32 2E 32 2E 37 F1 55)
- Device address: 0x01
- Function code: 0x2B
- MEI type: 0x0E
- Read Device ID Code: 0x01
- Conformity level: 0x01
- More Follows: 0x00
- Next Object ID: 0x00
- Number Of Object: 0x03
- Object ID: 0x00
- Object Length: 0x08
- Object Value: ‘Wilcoxon’ (Company Name field in ASCII, 0x57 0x69 0x6C 0x63 0x6F 0x78 0x6F 0x6E)
- Object ID: 0x01
- Object Length: 0x08
- Object Value: ‘24040004’ (Product Number field in ASCII, 0x32 0x34 0x30 0x34 0x30 0x30 0x30 0x34)
- Object ID: 0x02
- Object Length: 0x05
- Object Value: ‘2.2.7’ (Revision field in ASCII, 0x32 0x2E 0x32 0x2E 0x37)
"-CRC16"

11. 0x80(128) Error Code Details

Example of a client request and server exception response

Request		Response	
Field Name	*(Hex)*	*Field Name*	*(Hex)*
Function	01	Function	81
Starting Address Hi	04	Exception Code	02
Starting Address Lo	A1		
Quantity of Outputs Hi	00		
Quantity of Outputs Lo	01		

MODBUS Exception Codes		
Code	**Name**	**Meaning**
01	ILLEGAL FUNCTION	The function code received in the query is not an allowable action for the server (or slave). This may be because the function code is only applicable to newer devices, and was not implemented in the unit selected. It could also indicate that the server (or slave) is in the wrong state to process a request of this type, for example because it is unconfigured and is being asked to return register values.
02	ILLEGAL DATA ADDRESS	The data address received in the query is not an allowable address for the server (or slave). More specifically, the combination of reference number and transfer length is invalid. For a controller with 100 registers, the PDU addresses the first register as 0, and the last one as 99. If a request is submitted with a starting register address of 96 and a quantity of registers of 4, then this request will successfully operate (address-wise at least) on registers 96, 97, 98, 99. If a request is submitted with a starting register address of 96 and a quantity of registers of 5, then this request will fail with Exception Code 0x02 “Illegal Data Address” since it attempts to operate on registers 96, 97, 98, 99 and 100, and there is no register with address 100.
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for server (or slave). This indicates a fault in the structure of the remainder of a complex request, such as that the implied length is incorrect. It specifically does NOT mean that a data item submitted for storage in a register has a value outside the expectation of the application program, since the MODBUS protocol is unaware of the significance of any particular value of any particular register.
04	SLAVE DEVICE FAILURE	An unrecoverable error occurred while the server (or slave) was attempting to perform the requested action.

Table 11. 0x80(128) Error Code Details (Refer to MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b)